

CURRICULUM GUIDE

SUBJECT: Robotics

GRADE: 7th/8th GradeTIMELINE: 2nd Quarter

Standard	Kid Friendly Learning Objectives	Content (subject or topic covered in Journeys/My Perspectives)	DOK Level	Skills (ability, practice, aptitude that will be learned)	Assessment	Academic Vocabulary
Standard 2.0 Perform Electrical and Electronic Tasks 2.2 Troubleshoot voltage, current, and power in AC and DC circuits (i.e., fuse, continuity, etc.) 2.3 Identify and troubleshoot components and connections. 2.4 Read electrical drawings (i.e., simple starter circuits, PLC output, etc.)	The SWBAT observe the transfer of energy through a closed circuit. The SWBAT observe the absence of electrical current flow through an open circuit	zSpace Franklin's Lab Investigation: Open and Closed	2	Students will investigate the concept of circuits by comparing an open circuit with a closed circuit. They will observe electrical current flowing through the closed circuit, and they will explore ways to close the open circuit.	Investigation: Open and Closed Worksheet	Circuit Closed Circuit Components Electricity Open Circuit
	The SWBAT determine the requirements to light an LED. The SWBAT evaluate the purpose of resistors in a circuit.	zSpace Franklin's Lab Investigation: Resisting the Flow	2	Students will explore how changing resistors can "slow down" the flow of current. Students will discover that each type of LED has specific current and voltage requirement. They will use this knowledge to change the brightness of an LED.	Investigation: Resisting the Flow Worksheet	Circuit Closed Circuit Components Conductivity Current Electricity\ LED Open Circuit Voltage
	The SWBAT understand how AND and OR gates function. The SWBAT explore combinations of AND and OR gates.	zSpace Franklin's Lab AND OR Circuits	2	Students will be introduced to these gates and explore how they function and where they may be used in circuits other than microprocessors.	AND OR Circuits Worksheet AND OR Circuits Worksheet Table	AND gate Hard Drive Microprocessor OR gate
Standard 6.0 Perform Mechanical Systems Linkages Tasks 6.1 Explain gear reduction and install a belt or chain	The SWBAT demonstrate how mechanical power transmission systems are very important in the design and construction of	Unit 8 Mechanical Power Transmission (Day 1 – 10)	2	Students will learn about the different types of mechanical power transmission. Topics include various gear types, and how to calculate gear ratios.	Unit 8 Pre/Post Test Assessment of Vocabulary Engineering Notebook	Gear Gear Ratio Mechanical Advantage Transmission

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drive 6.2 Explain gear ratio and install a gear train. 6.3 Compute mechanical advantage of a belt or chain drive 6.4 Compute mechanical advantage of a gear train.	competition robots. The SWBAT vary the gear ratio (and the mechanical advantage) in a system, which gives them the versatility necessary to accomplish whatever work needs to be done. The SWBAT determine gear inputs & outputs by calculating the difference between them, and determine their gear ratio accordingly.			These principles will then be applied to the types of motor – arm systems seen on competition robots.		Spur Gear Bevel Gear Crown Gear Worm Gear Helical Gear Idler Gear Epicyclical (Planetary) Gear Rack and Pinion Gear Gear Pitch Levers Compound Gear Reductions
Standard 6.0 Perform Mechanical Systems Linkages Tasks 6.1 Explain gear reduction and install a belt or chain drive 6.2 Explain gear ratio and install a gear train. 6.3 Compute mechanical advantage of a belt or chain drive 6.4 Compute mechanical advantage of a gear train.	The SWBAT demonstrate how applied force and friction are related. The SWBAT distinguish between static and kinetic friction. The SWBAT calculate wheel speed. The SWBAT demonstrate how to calculate a gear reduction. The SWBAT compare and contrast the different types of drivetrains, along	Unit 9 Drivetrain Design (Day 1 -8)	2	Students will learn about the physical principles of friction and traction through the exploration of robot drivetrain design.	Unit 9 Pre/Post Test Assessment of Vocabulary Engineering Notebook	Friction Traction Drivetrain Static Friction Kinetic Friction Maximum Static Friction Magnitude Force of Friction Normal Force Tractive Force Drive Wheel Turning Point

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	with their benefits and drawbacks.					Turning Scrub Zero Radius Turn Ackermann Steering Skid Steer Omni Directional
Standard 8.0 identify Industrial Robot Type and the Tasks They Perform 8.2 Measure robotic performance against specified criteria 8.4 Simulate a solution	The SWBAT identify the failing components in an electronic toy. The SWBAT repair an electronic toy by replacing the broken components.	zSpace Franklin's Lab Troubleshooting zBot	2	Students will troubleshoot, identify problems, and repair a broken zBot.	Troubleshooting zBot Worksheet	Circuit Current Electricity LED Motor Ohms Resistance Resistors Switch Troubleshooting
	The SWBAT design a simple robot with the backpack items available. The SWBAT identify and use the components required to build a simple robot with two circuits. The SWBAT redesign the robot based on constraints and expectations.	zSpace Franklin's Lab zBot Challenge	2	Students will design and build a zBot without worrying about damaging or wasting valuable components during the exploration process. zSpace's special robot has components that can be explored, changed, destroyed, and rebuilt without any concern over use of materials.	zBot Challenge Worksheet	Circuit Current Electricity LED Motor Ohms Resistance Resistors Switch

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Standard 8.0 Identify Industrial Robot Types and the Tasks they Perform 8.1 Identify robot types and degrees of freedom (i.e., SCARA, articulated, Cartesian, delta, etc.)	The SWBAT differentiate the three degrees of freedom that are presented on the beginning of the unit. The SWBAT demonstrate the correct use of the calculations needed to choose a gear reduction. The SWBAT distinguish between the use of linkage system and a multi-state elevator in manipulator design. The SWBAT explain how passive assistance can improve a robot design.	Unit 10 Lifting Mechanisms (Day 1 – 11)	2	Students will learn about the different types of lifting mechanisms and how they work. Engineering topics will include degrees of freedom, shock load, joint loading, joint speed, elevators, linkages, and passive assistance.	Unit 10 Pre/Post Test Assessment of Vocabulary Engineering Notebook	Object manipulators Lifting mechanisms Degrees of freedom First degree of freedom Second degree of freedom Third degree of freedom Shock load Joint loading Joint speed Mechanical advantage Factor of Safety Elevator Actuation Linkages Passive assistance
Standard 12.0 Develop Robotics Application Systems 12.5 Use software tools to develop a robotics application.	The SWBAT launch VEXcode VR. The SWBAT load, rename, and save a project. The SWBAT move, remove, and delete	VEXcode VR Unit 1 Introduction and Fundamentals Lesson 1: Getting Started with VEXcode VR Lesson 2: Opening an	1	Students will identify how to launch VEXcode VR and identify the features of a VR Robot and playground.	Vr.vex.com Engineering Notebook	

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12.6 Use a simulation to develop and validate a design for a robotics problem.	blocks. The SWBAT identify and describe the five different block shapes in VEXcode VR. The SWBAT change, duplicate, undo/redo blocks and the benefits of doing so.	Example and Running Your First Project Lesson 3: Block Shapes and Their Meaning Lesson 4: Tips and Tricks with VEXcode VR				
	The SWBAT identify that programming language is a set of rules in which symbols represent actions. The SWBAT identify how to use the [Drive for] block to drive the VR Robot a specific distance. The SWBAT identify how to use the [Turn for] block to turn the VR Robot right or left. The SWBAT apply Drivetrain commands to solve the Castle Crasher Challenge to knock over the buildings.	VEXcode VR Unit 2 – Moving Your Robot Lesson 1 – Computer Science Level 1 – Blocks Lesson 2 – Driving for Distance – Moving Forward and in Reverse Lesson 2: Change Parameters in the [Drive for] Block Lesson 3: Turning the VR Robot Lesson 3: Turn to Heading Lesson 4: Castle Crasher Challenge Unit Exam	1	Students will solve the Castle Crasher challenge. They will use VEXcode VR to make the VR Robot utilize the Drivetrain commands in order to move around the Castle Crasher Playgournd.	Vr.vex.com Castle Crasher challenge Engineering Notebook Unit 2 Exam	